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Marine Casualty Investigations

Enquêtes sur les accidents maritimes

Investigation Report to the Minister pursuant to sections 542 or 545 of the Canada Shipping Act

Rapport d'investigation au Ministre conformément aux articles 542 ou 545 de la Loi sur la marine marchande du Canada

Canada

Ce rapport est aussi disponible en français

REPORT OF INVESTIGATION INTO THE CIRCUMSTANCES SURROUNDING THE GROUNDING OF THE U.S. FREIGHTER "GEORGE A. SLOAN" IN THE AMHERSTBURG CHANNEL, DETROIT RIVER, ON OCTOBER 19, 1987

REPORT No. 500

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REPORT OF INVESTIGATION INTO THE CIRCUMSTANCES SURROUNDING THE GROUNDING OF THE U. S. FREIGHTER "GEORGE A SLOAN" IN THE AMHERSTBURG CHANNEL, DETROIT RIVER ON OCTOBER 19, 1987.

Particulars of the vessel

Name	"GEORGE A. SLOAN"
Official Number	243416
Port of Registry	Duluth, Minnesota
Flag	U. S. A.
Call Sign	WA5307
Gross Tonnage	9,706
Net Tonnage	7,300
Length	189.14 m
Breadth	18.37 m
Depth	10.67 m
Draught (at time of incident	F: 6.07 m M: 6.15 m A: 6.58 m
Type	Great Lakes Self-Unloader
Built	Steel 1943, River Rouge, Mi., U.S.A.
Re-built	1985 re-engined - steam reciprocating engine removed, boilers left on board
Propulsion	One 16 cylinder Caterpillar diesel driving a single Controllable Pitch Ka-Me-Wa propeller. 4,500 B.H.P.
Bow Thruster	Fitted
Cargo	10,643 tonnes coal
Crew	27
Classification	American Bureau of Shipping
Owner	U.S.S. Great Lakes Fleet Services Inc. Duluth, Minnesota, U. S. A.

Navigating Equipment

Radar 1	Raytheon, Mariner Pathfinder
Radar 2	Sperry
Direction Finder	R.C.A. AR 703-BY
Echo Sounder	Raytheon DE760
Loran C	Northstar 7,000
VHF 1	Northstar Radio N550
VHF 2	Raytheon RAY 55
SSB	ICOM ICM700
Gyro Compass	Sperry
Magnetic Compass	Frank Morrison & Sons Co., Cleveland
Course Recorder	Not fitted

Certificates

Load Line Certificate	A Great Lakes Load Line Certificate was issued by the American Bureau of Shipping for the vessel at New York on June 3, 1986, with expiry May 22, 1990.
USCG Steamship Inspection Certificate	Issued at Milwaukee, Wisconsin on April 27, 1987 with expiry April 27, 1989.

Background

Note: All times in this report are expressed in Eastern Daylight Saving Time (U.T.C. minus 4 hours).

On October 19, as the "GEORGE A. SLOAN" loaded with coal was approaching Amherstburg in the Detroit River, a leak was observed in the joint of a hydraulic oil pipe of the telemotor system controls of the steam steering gear. An attempt to tighten the coupling nut at the joint resulted in the leak increasing. The hand electric steering controls were in use at the time, and an attempt to isolate the leak resulted in

both the hand electric and telemotor controls becoming locked. This happened as the wheel was amidships while making a 20° alteration to port in the Amherstburg Channel. The ship's head continued to swing to port, and the port anchor was dropped, but the vessel grounded heavily on Bois Blanc Island causing severe damage to the bottom of the hull. After applying compressed air to the damaged tanks and discharging some of the coal cargo, the vessel was refloated the next day and taken to Toledo, Ohio for repairs.

Narrative

The "GEORGE A. SLOAN", loaded a cargo of 10,643 t of coal at Ashtabula, Ohio for Green Bay, Wisconsin, and entered the Detroit River at 0730, October 19, 1987.

While on the Hackett Reach of the Amherstburg Channel, the master was on the bridge, and the second mate was directing the vessel's course and speed. The controllable pitch propeller was set at 1,83 m (6 feet) pitch giving a speed of approximately 9.2 knots over the ground. The gyro compass was correct, and the wheelsman was using the wheel of the electric steering controls.

As the engineer going on duty was changing his clothes at the top of the engine room, he noticed a drip from the coupling of a pipe in the idling telemotor controls of the steering engine.

By the time he had completed putting his overalls on, the leak had increased, and hydraulic oil was spurting from the joint. He tried unsuccessfully to tighten the coupling with a wrench. Assistance arrived at the steering gear. It was decided to limit the leakage of oil by opening a by-pass valve near the telemotor unit and by closing the valves on the two lines leading to bridge.

Unfortunately, as two other closed valves prevented the local by-pass valve being effective, the flow of hydraulic oil in the system was blocked and the electric steering controls were thus also locked. The rudder was amidships.

At this time (about 0809), the vessel's head was swinging slowly to port to make the 19° 15' alteration of course to come to the Amherstburg Reach Range (355° 45'). The wheelsman reported that the rudder was not answering the wheel. The order was given to change over to telemotor steering.

The electric steering handle was switched off and the

by-pass valve on the telemotor steering was closed. Two men were unable to turn the telemotor steering wheel. The master started the bow thrust motor.

The master ordered an anchor be let go, and the watchman and second mate ran down to the windlass. The brake was released, the port anchor fell into the water and as the chain ran out, the brake was gradually applied. The vessel grounded heavily on the west side of the Amherstburg Channel. The time was 0810. It was verified that the watertight doors in the tunnel, and the guillotine gates on the cargo conveyor belts were secured. Sarnia Vessel Traffic Service was informed by radio as the "FRONTENAC" was reported to be upbound about two miles downstream. The "FRONTENAC" continued upbound and passed carefully by the stern of the "GEORGE A. SLOAN".

Soundings showed the double bottom tanks No. 1 to 6 on the port side and No. 1 on the starboard side had been breached.

It was decided to apply compressed air to these tanks compressors were placed on board and connected, along with the vessel's own compressor, to the air pipes of these double bottom tanks.

The tugs "SHANNON" and "CAROLYN HOEY" were engaged, and the self-unloader "CALCITE II" (8,243 tons gross) of the same owners was diverted to the "GEORGE A. SLOAN" to be used for lightening cargo.

Compressed air was applied, and the "CALCITE II" was brought alongside at 1940 on October 20th with the "SHANNON" and "CAROLYN HOEY" secured aft and forward respectively. Using her own self-unloading gear, the "GEORGE A. SLOAN" discharged 635 t of coal from the area of hatch No. 5, to raise the bow and maintain the stern at constant depth. This was accomplished at 2045. After further assessment of the situation, 544 t of cargo were discharged from gates 45 to 47 between 2115 and 2132.

Slight movements of the vessel could be detected, and the tugs began to gradually apply weight to the tow lines. The vessel floated free at 2214, and the "CALCITE II" was let go at 2220. Permission was given for the "GEORGE A. SLOAN" to make for Toledo, Ohio to discharge the rest of her cargo, and to carry out a damage survey and permanent repairs.

The port anchor, which had been lost when the anchor chain broke during the grounding was located, and the U.S. tug "PROTECTOR" recovered it at 1753, October 22, and

transported it to Detroit.

Analysis

1. Description of the vessel

The "GEORGE A. SLOAN" is a Great Lakes Self-Unloader with the wheel-house, some accommodation and the unloading conveyor boom forward. The engine room and the rest of the accommodation are aft. There are four holds, sixteen hatches, and two hold conveyor belts.

Originally, the propulsion was a steam triple expansion reciprocating engine. This was replaced in 1985 by a new Caterpillar diesel engine and a controllable pitch propeller, but the boilers and steam auxiliary machinery were retained.

2. Steering Gear

The steam steering engine is a Hyde Windlass Co., Bath, Maine, 9 X 9 Type No. 14002 manufactured by Robins Conveying Belt Co., Passaic, N.J., U.S.A., and it would appear that it was originally designed to be controlled by the "Hyde Telemotor", Hyde Windlass Co., Bath, Maine in the wheel-house, and a double manual steering wheel on the poop for emergencies. A Sperry Gyro Pilot and hand electric steering wheel are mounted forward of the telemotor pedestal in the wheel-house, and the hand electric is the mode of choice in narrow waters, the Hyde telemotor being kept for emergency alternative steering.

At the steering gear, the hand electric controls operate through sprocket wheels and chain to control the steam valves. In order for the telemotor steering gear to be immediately available in case of an electrical failure, the control cylinder of the after telemotor remains connected to the steam valves and moves to port and starboard with the movements initiated by the electrical controls, with resulting flow of hydraulic oil in the telemotor hydraulic lines.

To allow free movement of this oil, a by-pass valve on the bridge telemotor allows the oil to flow.

3. Steering Gear Piping & Recharging System

The steering gear space is common with the after end of the engine room below the main deck. The hydraulic

system has a means of recharging the oil consisting of a cistern, hand pump, pressure gauges and bleeder valves. There is also a valve in each of the pipe lines to the wheel-house for isolation purposes.

The telemotor control cylinder, pressure gauges and valves are located under the main deck above the steam steering engine.

When in the hand electric mode, the leak of hydraulic oil was observed in the joint where a 1" U-shaped pipe is secured to the starboard plunger of the after telemotor. The cause of the pipe fracture was not ascertained.

The operation of the steering telemotor and hydraulic oil charging system are fully described in the instruction book on board, with the exception of the valve arrangement aft of the telemotor control cylinder. There were instructions posted on a board for operating the five clutches during steering gear change over but none for the valve arrangement.

The arrangement of five valves in the recharging system allows for:

a. Two valves in each of the two pipe lines allowing the charging system, cistern and pump to be isolated from the telemotor steering system except when recharging. These valves were closed before, during and after the grounding.

b. Between these isolation valves and the telemotor system are three valves, one in each charging line and one in a cross-over pipe between the charging lines, which allows the hydraulic fluid to circulate if the lines to the wheel-house are isolated. Those were all closed before the leak developed.

   When it was decided to isolate the wheel-house to limit the leakage of hydraulic fluid, the valve in the cross-over line was opened, and then the valves isolating the wheel-house were closed.

   The two valves between the cross over line and the telemotor cylinder were not opened at this time and this prevented the circulation of fluid between both sides of the telemotor cylinder thus effectively locking the cylinder and preventing the electric steering controls from functioning.

4. Warning to Bridge

There was no steering gear alarm sounded as the electrical system did not fail.

Verbal warning was not given from the steering gear to the bridge that there were problems with the hydraulic steering lines.

5. Necessity for Stopping Leak of Hydraulic Oil

While it is imprudent to allow oil to spurt freely in an engine room, it was not absolutely necessary for the leak to be stopped before warning of the problem was given to the bridge, the vessel placed in a position of safety and repairs attempted.

6. Weather

The weather was reported to be wind SW 10 knots, smooth sea, and good visibility.

7. Damage

The draughts after grounding were:-

Forward	19' 5"	(5.92 m)
Amidships Port	19' 01"	(5.81 m)
Starboard	20' 02"	(6.15 m)
Aft	20' 05"	(6.22 m)

The damage was all aft of the collision bulkhead. The bilge strakes in way of Number 1 to 6 port side double bottom tanks were holed, and associated internals set up as much as 25 cm (10") in places. No. 1 DB starboard was holed near the centre line, and Nos. 2 and 3 starboard DB tanks bottom plating and internals were set up slightly. The estimated cost of repairs was $600,000 (U. S.) with completion towards the end of November 1987.

8. Speed

At the time of the grounding, the engine and pitch propeller controls were still at full ahead, and the speed on impact was about 9 knots.

9. Equipment Tests

All the navigation equipment was tested prior to the vessel leaving Lorain, Ohio early on the morning of October 18.

10. Repairs to Steering Gear

The leaking copper pipe was repaired by brazing on board. On being re-assembled, the telemotor hydraulic system was re-charged and tested and found to operate correctly.

11. Traffic Disruption

The stern of the "GEORGE A. SLOAN" extended slightly into the deep water channel.

Two way traffic, under certain conditions was authorized in the Livingstone Channel on October 19, at 0928, and the Amherstburg Channel was closed to navigation at 1900 the same day. Opposing traffic in the Livingstone Channel was required by V.T.S. Sarnia to make passing arrangements.

Amherstburg Channel was re-opened to upbound traffic at 0800 on October 20, and closed again at 1325 during salvage and lightening operations.

At 0003, on October 21, normal traffic was resumed in the Amherstburg Channel. Disruption to traffic occurred when vessels had to reduce speed when arranging to meet at specified passing points in the Livingstone Channel and when close to the grounded vessel in the Amherstburg Channel.

12. Certification of Officers

The Master of "GEORGE A. SLOAN" holds a United States Coast Guard Certificate as Master of an Inland Waters Steamship issued originally in 1976, and re-issued March 7, 1986. He has been sailing for 37 years on the Great Lakes with five years as master. He joined the vessel thirty days before the casualty.

The Chief Engineer holds a United States Coast Guard Certificate as Chief Engineer Steam & Motor any horse-power issued originally in 1971, and re-issued January 19, 1986.

The First Assistant Engineer holds a U.S.C.G. Certificate as First Assistant Engineer Steam & Motor of any horse power issued originally in 1981, and re-issued May 7, 1984. He has sailed for the last 3 years on the "GEORGE A. SLOAN".

Findings

At 0809 on October 19, 1987, while altering course in the Amherstburg Channel of the Detroit River, the U. S. self-unloader "GEORGE A. SLOAN" sustained steering control problems and grounded heavily on Bois Blanc Island causing extensive damage to the hull.

It would appear that the following factors contributed to this casualty:

- a fracture of unknown cause developed at the joint of the hydraulic pipe and the starboard plunger of the telemotor steering control piston above the steam steering gear;

- an attempt to stop the leak thus caused by tightening the coupling nut was unsuccessful;

- the measures taken in the steering compartment in an attempt to isolate the leaking hydraulic fluid resulted in the hydraulic telemotor control becoming locked in place;

- with the idling telemotor hydraulic controls locked, the electric steering controls could not be moved;

- the bridge change-over from electric steering to telemotor steering control was thus ineffective; and

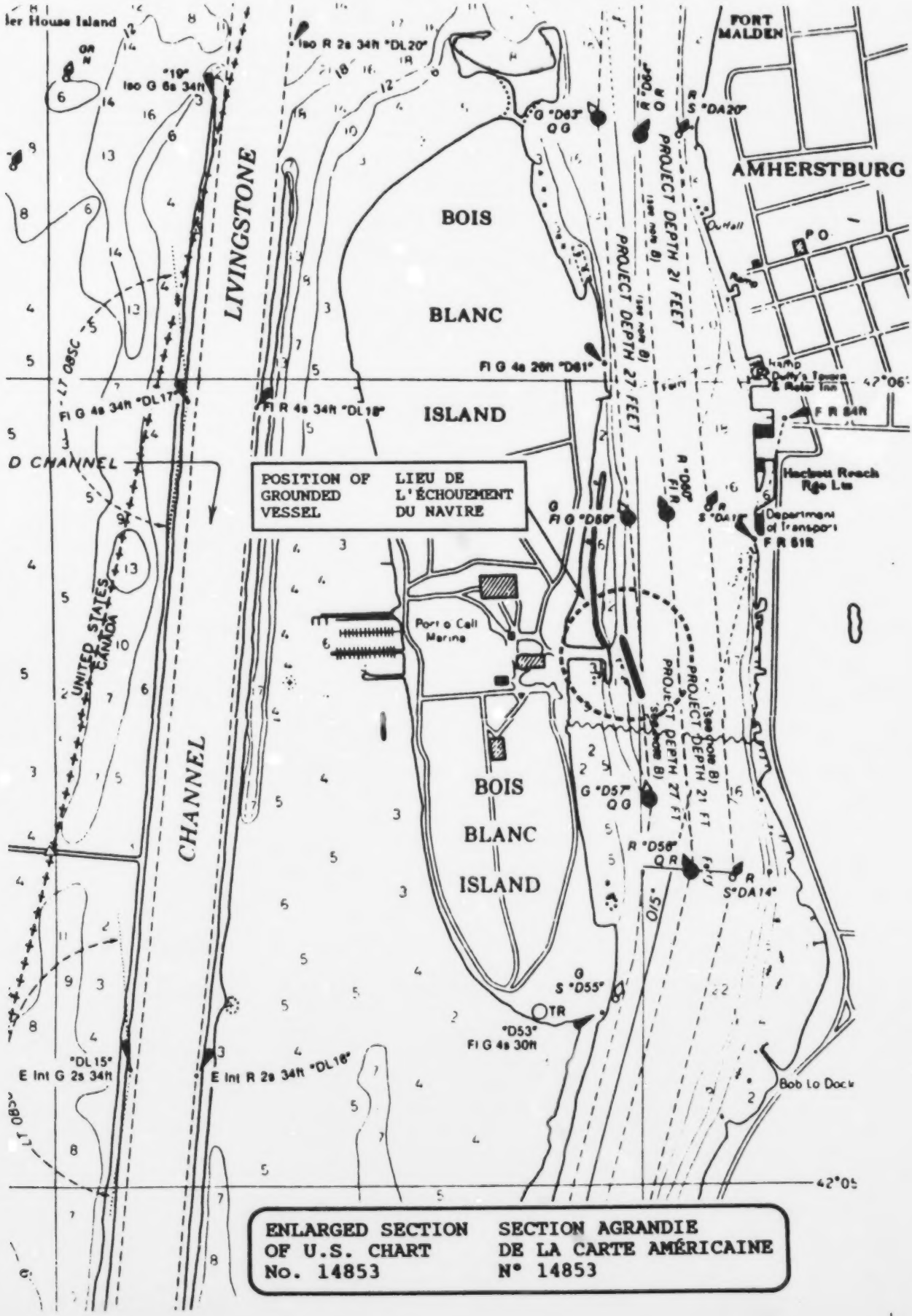
- although the port anchor was dropped, and the bow thruster motor was started, the vessel grounded before these measures took effect.

Other Findings

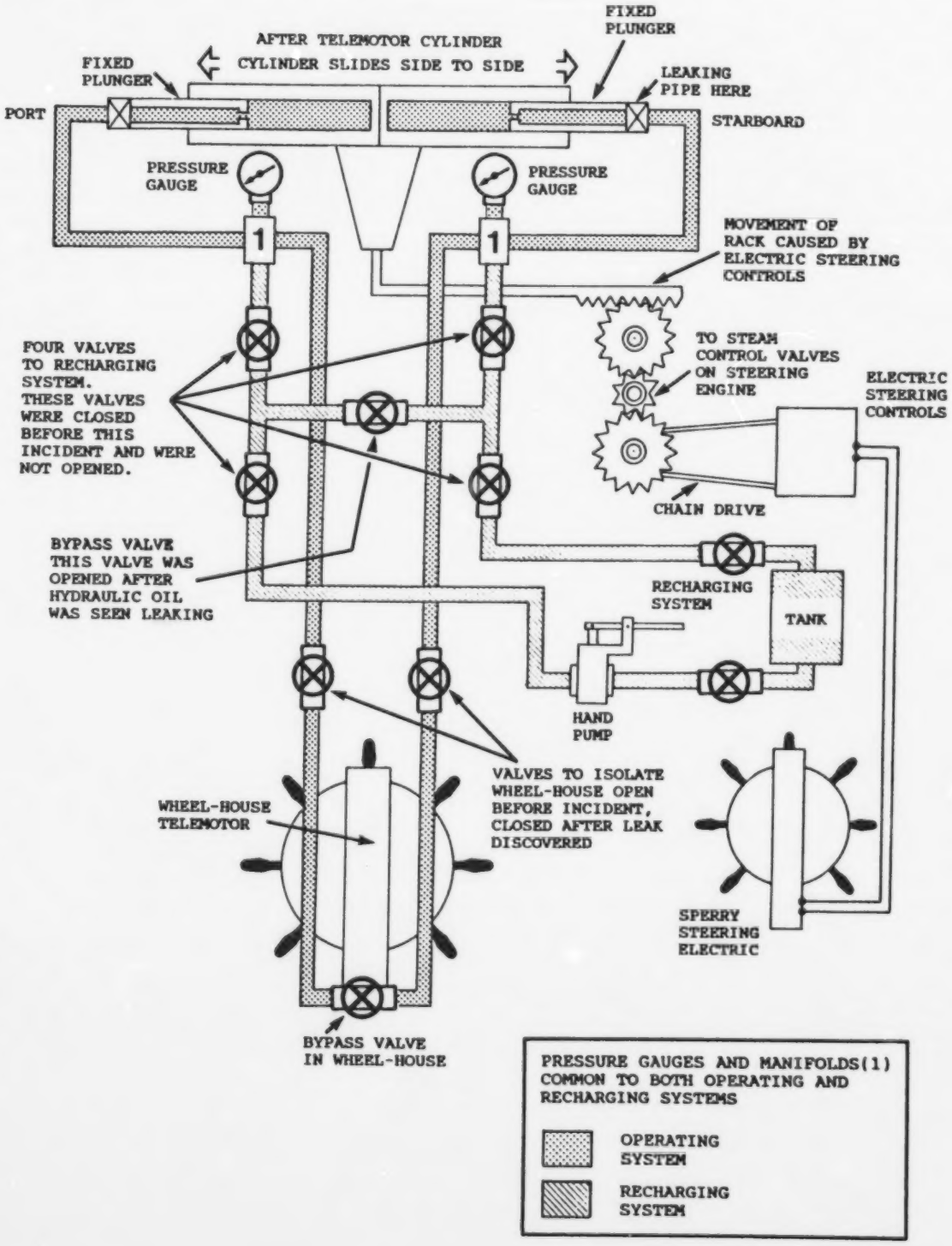
The staunching of the leakage into the engine room of hydraulic fluid, although highly desirable was less important than leaving the electric steering controls operative in the narrow confines of the Amherstburg Channel.

Salvage was undertaken promptly, and the vessel was refloated in a professional manner without incurring any further damage.

OTTAWA, ONTARIO
MAY 1988.


LIVINGSTONE CHANNEL
BOIS BLANC ISLAND
BOIS BLANC ISLAND
AMHERSTBURG
FORT MALDEN
PROJECT DEPTH 27 FEET
PROJECT DEPTH 21 FEET
POSITION OF GROUNDED VESSEL
LIEU DE L'ÉCHOUEMENT DU NAVIRE
Iso R 2s 34ft "DL20"
Iso G 6s 34ft
Fl G 4s 26ft "D61"
Fl G 4s 34ft "DL17"
Fl R 4s 34ft "DL18"
Fl G "D63"
Fl G "D60"
R "D58"
G "D57"
G "D55"
"D53"
Fl G 4s 30ft
E Int G 2s 34ft "DL15"
E Int R 2s 34ft "DL18"
Port o Call Marina
Bob Lo Dock
Hackett Reach Rge Lts
Department of Transport
F R 84R
F R 51R
42°06
42°05
ENLARGED SECTION OF U.S. CHART No. 14853
SECTION AGRANDIE DE LA CARTE AMÉRICAINE N° 14853

SCHEMATIC DIAGRAM OF STEERING CONTROLS


FIXED PLUNGER
AFTER TELEMOTOR CYLINDER
CYLINDER SLIDES SIDE TO SIDE
FIXED PLUNGER
LEAKING PIPE HERE
PORT
STARBOARD
PRESSURE GAUGE
PRESSURE GAUGE
1
1
MOVEMENT OF RACK CAUSED BY ELECTRIC STEERING CONTROLS
TO STEAM CONTROL VALVES ON STEERING ENGINE
ELECTRIC STEERING CONTROLS
FOUR VALVES TO RECHARGING SYSTEM. THESE VALVES WERE CLOSED BEFORE THIS INCIDENT AND WERE NOT OPENED.
CHAIN DRIVE
BYPASS VALVE THIS VALVE WAS OPENED AFTER HYDRAULIC OIL WAS SEEN LEAKING
RECHARGING SYSTEM
TANK
HAND PUMP
VALVES TO ISOLATE WHEEL-HOUSE OPEN BEFORE INCIDENT, CLOSED AFTER LEAK DISCOVERED
WHEEL-HOUSE TELEMOTOR
SPERRY STEERING ELECTRIC
BYPASS VALVE IN WHEEL-HOUSE
PRESSURE GAUGES AND MANIFOLDS(1) COMMON TO BOTH OPERATING AND RECHARGING SYSTEMS
OPERATING SYSTEM
RECHARGING SYSTEM

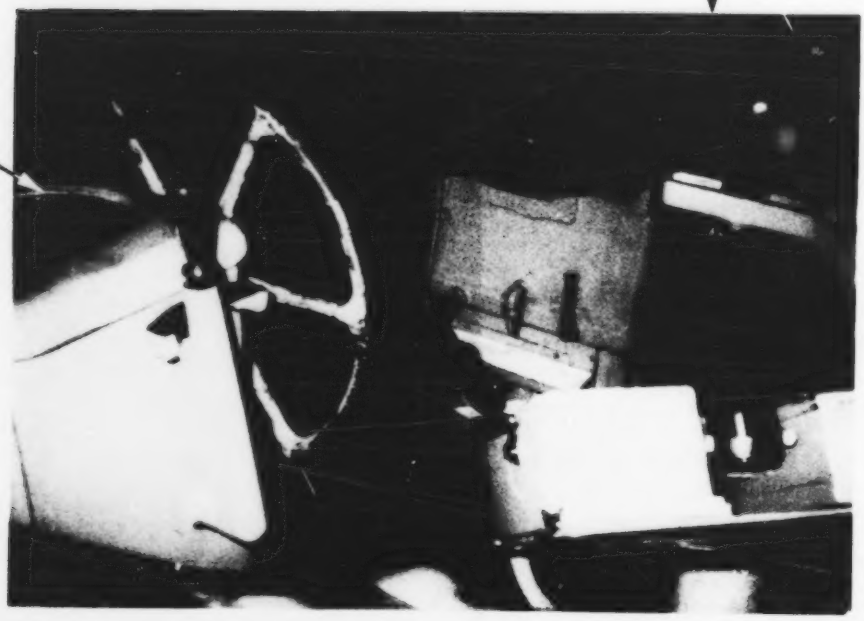
"GEORGE A SLOAN"

Telemotor Steering Pedestal

Socle du télémoteur de la gouverne

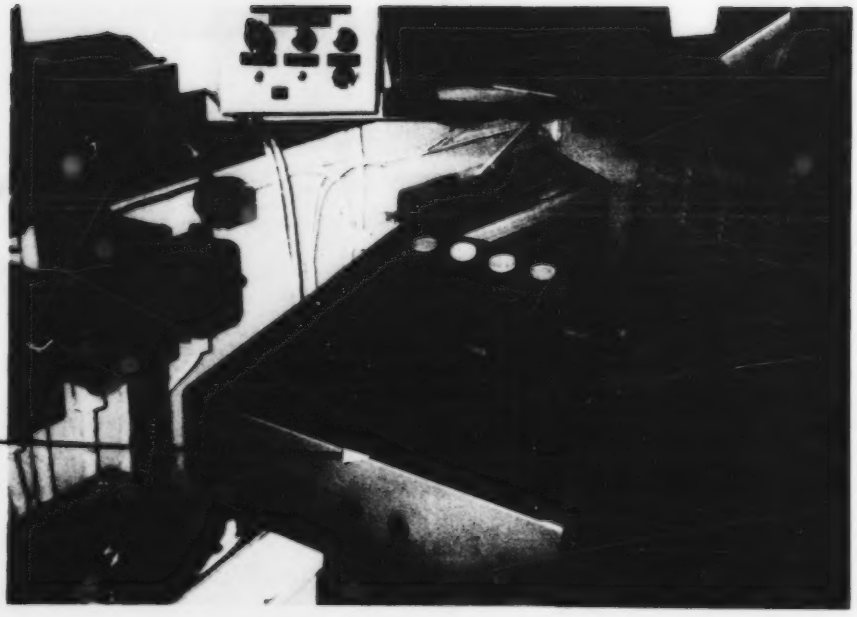
Sperry electric steering pedestal

Socle du gouvernail électrique Sperry



Wheel-house Propeller Pitch Controls

Commandes du pas des d'hélice de la timonerie



"GEORGE A SLOAN"

Finger Points to Brazed Repair.
Le doigt montre la réparation au laiton.

Hydraulic steering controls. Pipe fractured at base of flange.

Commandes de la gouverne hydraulique. Tuyau cassé à la base de la collerette.

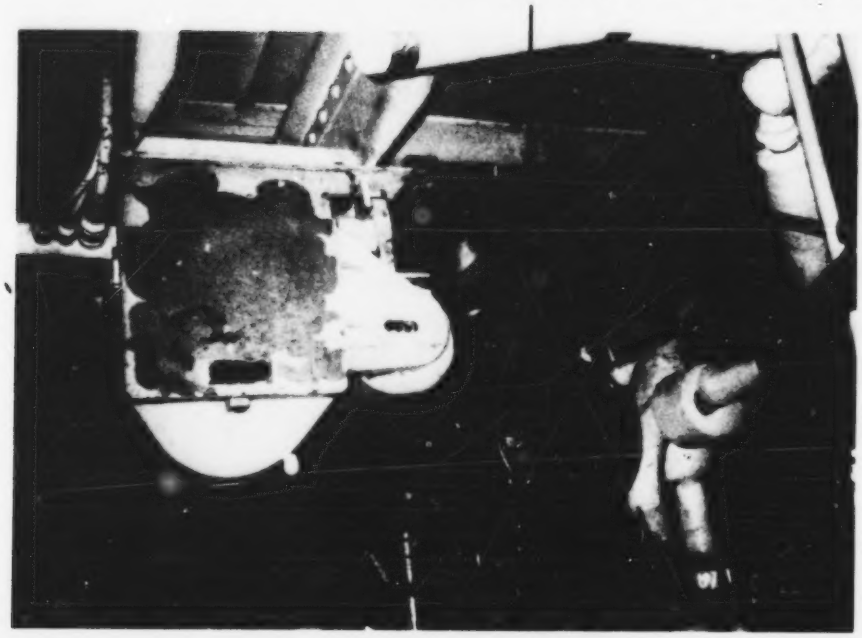
Position of pipe attaching hydraulic line to starboard telemotor plunger.

Endroit où le tuyau se joint au conduit hydraulique au piston du télémoteur tribord.

"GEORGE A SLOAN"

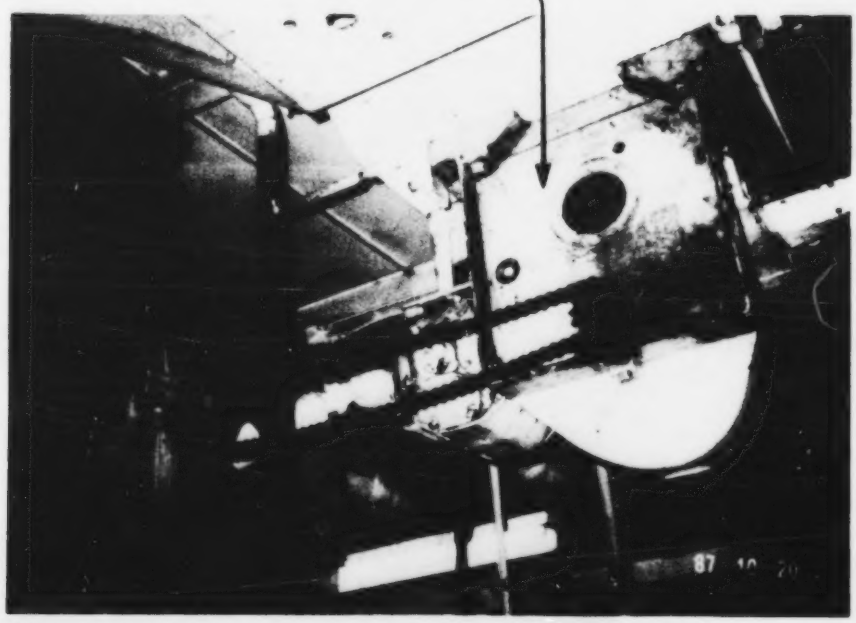
View from forward.
Vue de l'avant.

Telemotor Component
Composante du télémoteur



Electric
Steering
Controls

Commandes de
la gouverne
électrique

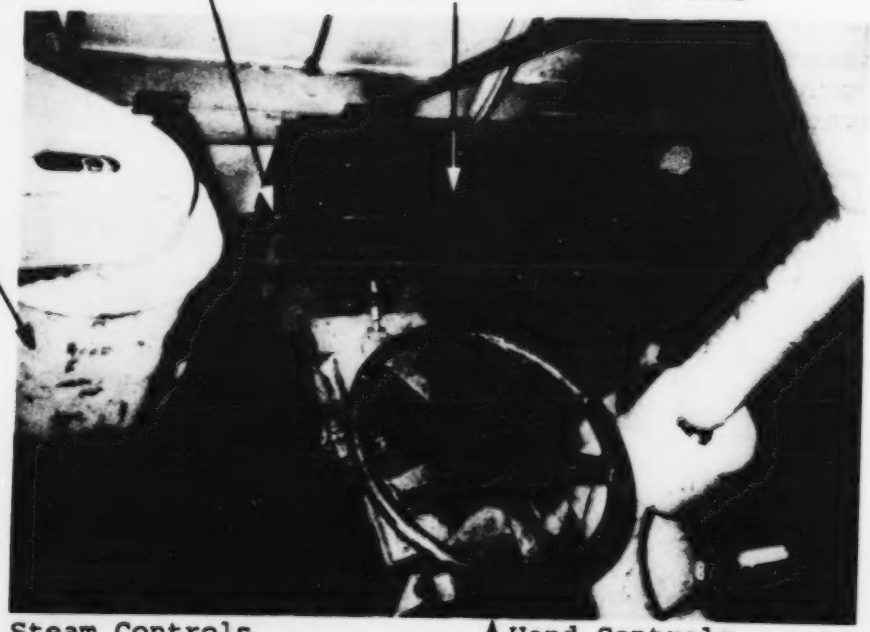


View from aft.
Vue de l'arrière.

"GEORGE A SLOAN"

Recharging the Telemotor Hydraulic System.

Rechargement du système hydraulique du télémoteur.



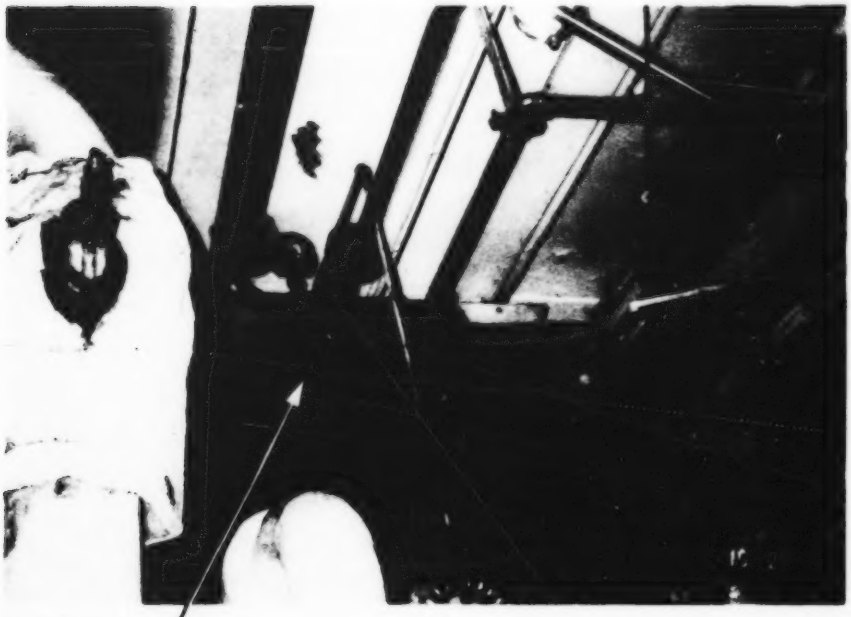
"GEORGE A SLOAN"

View from after end of steering gear.
Telemotor cylinder recharging pipes
and valves.

Vue de l'arrière de l'appareil à
gouverner. Cylindre du télémoteur
rechargeant les tuyaux et soupapes.

Clutch Changeover Instructions.

Instructions pour le changement
d'embrayage.



By-Pass Valve

Soupape du conduit
de dérivation